What is claimed is:

1. An image data conversion method for converting input image data for four color components of cyan, magenta, yellow, and black into output image data for recording operation, the method comprising the steps of:

receiving input image data for four color components of cyan, magenta, yellow, and black;

dividing the input image data for black component into distribution data for the four color components of cyan, magenta, yellow, and black, thereby converting the input image data for the black component into output image data for the black component; and

combining the distribution data for cyan, magenta, and yellow color components and the input image data for the cyan, magenta, and yellow color components, respectively, thereby converting the input image data for the three color components of cyan, magenta, and yellow into output image data for the three color components of cyan, magenta, and yellow.

2. An image data conversion method as claimed in claim 1, wherein the distribution data for the black color component has a characteristic that the distribution data has a tone value of zero when the tone value of the input image data for the black component is lower than a predetermined reference tone value, that the tone value of

the distribution data becomes greater than zero when the tone value of the input image data for the black component is equal to or greater than the predetermined reference tone value, and that the tone value of the distribution data increases as the tone value of the input image data for the black component increases from the predetermined reference tone value.

3. An image data conversion method as claimed in claim 1, wherein the distribution data for the three color components of cyan, magenta, and yellow has tone values to reproduce, with cyan, magenta, and yellow color components, a gray scale whose tone level corresponds to a difference between the tone value of the distribution data for the black component and the tone value of the input image data for the black component.

4. An image data conversion method as claimed in claim 1, wherein the reference tone value is set to a tone value that can produce, according to the distribution data for the three color components of cyan, magenta, and yellow, a color patch that has an optical density whose value has a predetermined relationship with another optical density represented by another color patch that is produced according to image data of the maximum tone value for the black color component.

5. An image data conversion method as claimed in

claim 4, wherein the reference tone value is set to a tone value that can produce, according to the distribution data for the three color components of cyan, magenta, and yellow, a color patch that has an optical density whose value is equal to a half of another optical density represented by another color patch that is produced according to image data of the maximum tone value for the black color component.

6. An image data conversion method as claimed in claim 1, wherein the manner of combining the distribution data to the input image data is switched according to the tone values of the input image data for the three color components of cyan, magenta, and yellow.

7. An image data conversion method as claimed in claim 6, wherein the dividing step includes the step of combining the distribution data for black color component with the input image data for the black color component, thereby converting the input image data for the black color component into the output image data for the black color component.

8. An image data conversion method as claimed in claim 7, wherein when a brightness index, determined based on the tone values of the input image data for the three color components of cyan, magenta, and yellow, is located in a predetermined dark tone region, the input image data for the four color components of cyan, magenta, yellow, and

black is converted, as it is, into the output image data, and

wherein when the brightness index is located in a predetermined intermediate tone region, the distribution data for the four color components is adjusted before being combined with the input image data for the corresponding colors.

9. An image data conversion method as claimed in claim 8, wherein when the brightness index is located in the predetermined intermediate tone region, the distribution data for the four color components is multiplied with a coefficient, of a value greater than zero (0) and smaller than one (1), before being combined with the input image data for the corresponding colors.

10. An image data conversion method as claimed in claim 1, wherein the input image data for the three color components of cyan, magenta, and yellow is subjected to a compression process before being combined with the distribution data for the three color components of cyan, magenta, and yellow, thereby preventing the output image data from exceeding a predetermined maximum tone value.

11. An image data conversion apparatus for converting input image data for four color components of cyan, magenta, yellow, and black into output image data for recording operation, the apparatus comprising:

a receiving unit receiving input image data for four color components of cyan, magenta, yellow, and black;

a dividing unit dividing the input image data for black component into distribution data for the four color components of cyan, magenta, yellow, and black, thereby converting the input image data for the black component into output image data for the black component; and

a combining unit combining the distribution data for cyan, magenta, and yellow color components and the input image data for the cyan, magenta, and yellow color components, respectively, thereby converting the input image data for the three color components of cyan, magenta, and yellow into output image data for the three color components of cyan, magenta, and yellow.

12. An image data conversion apparatus as claimed in claim 11, wherein the distribution data for the black color component has a characteristic that the distribution data has a tone value of zero when the tone value of the input image data for the black component is lower than a predetermined reference tone value, that the tone value of the distribution data becomes greater than zero when the tone value of the input image data for the black component is equal to or greater than the predetermined reference tone value, and that the tone value of the distribution data increases as the tone value of the input image data for the

black component increases from the predetermined reference tone value.

13. An image data conversion apparatus as claimed in claim 11, wherein the distribution data for the three color components of cyan, magenta, and yellow has tone values to reproduce, with cyan, magenta, and yellow color components, a gray scale whose tone level corresponds to a difference between the tone value of the distribution data for the black component and the tone value of the input image data for the black component.

14. An image data conversion apparatus as claimed in claim 11, wherein the reference tone value is set to a tone value that can produce, according to the distribution data for the three color components of cyan, magenta, and yellow, a color patch that has an optical density whose value has a predetermined relationship with another optical density represented by another color patch that is produced according to image data of the maximum tone value for the black color component.

15. An image data conversion apparatus as claimed in claim 14, wherein the reference tone value is set to a tone value that can produce, according to the distribution data for the three color components of cyan, magenta, and yellow, a color patch that has an optical density whose value is equal to a half of another optical density represented by

another color patch that is produced according to image data of the maximum tone value for the black color component.

16. An image data conversion apparatus as claimed in claim 11, wherein the manner of combining the distribution data to the input image data is switched according to the tone values of the input image data for the three color components of cyan, magenta, and yellow.

17. An image data conversion apparatus as claimed in claim 16, wherein the dividing unit includes a unit combining the distribution data for black color component with the input image data for the black color component, thereby converting the input image data for the black color component into the output image data for the black color component.

18. An image data conversion apparatus as claimed in claim 17, wherein when a brightness index, determined based on the tone values of the input image data for the three color components of cyan, magenta, and yellow, is located in a predetermined dark tone region, the input image data for the four color components of cyan, magenta, yellow, and black is converted, as it is, into the output image data, and

wherein when the brightness index is located in a predetermined intermediate tone region, the distribution data for the four color components is adjusted before being

combined with the input image data for the corresponding colors.

19. An image data conversion apparatus as claimed in claim 18, wherein when the brightness index is located in the predetermined intermediate tone region, the distribution data for the four color components is multiplied with a coefficient, of a value greater than zero (0) and smaller than one (1), before being combined with the input image data for the corresponding colors.

20. An image data conversion apparatus as claimed in claim 11, wherein the input image data for the three color components of cyan, magenta, and yellow is subjected to a compression process before being combined with the distribution data for the three color components of cyan, magenta, and yellow, thereby preventing the output image data from exceeding a predetermined maximum tone value.

21. A data storage medium storing, in a manner readable by a computer, data of an image data conversion program for converting input image data for four color components of cyan, magenta, yellow, and black into output image data for recording operation, the program comprising:

a program of receiving input image data for four color components of cyan, magenta, yellow, and black;

a program of dividing the input image data for black component into distribution data for the four color

components of cyan, magenta, yellow, and black, thereby converting the input image data for the black component into output image data for the black component; and

a program of combining the distribution data for cyan, magenta, and yellow color components and the input image data for the cyan, magenta, and yellow color components, respectively, thereby converting the input image data for the three color components of cyan, magenta, and yellow into output image data for the three color components of cyan, magenta, and yellow.

22. A data storage medium as claimed in claim 21, wherein the dividing program includes a program of combining the distribution data for black color component with the input image data for the black color component, thereby converting the input image data for the black color component into the output image data for the black color component.